

Careyville Wells

HUTCHINSON, KANSAS

EAST

VigIndustries

VigIndustries, Inc.
a subsidiary of
The Mosaic Company

Project Description

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Drilling activity and various testing techniques took place on the vacant lots to the north and east of the Careyville neighborhood beginning in mid-April. As you know, this area was the site of several solution mining wells mined by the former Carey Salt Company and its successors.

Since January 2005, VigIndustries, Inc. has been involved in stabilizing and monitoring the large sinkhole that developed near the railroad track on the north part of the property. VigIndustries acquired ownership of this parcel of land in a merger that occurred in 2004. We are not in the salt business and our business plan does not reflect a need to use this specific property, but we do feel an obligation to assess the property just in case any maintenance is needed.

We are currently working with the City of Hutchinson and the Kansas Department of Health and Environmental Control to determine the best solutions for long-term management of the former wells and providing for the continuance of a safe neighborhood.

For more information, you may contact us by telephone at 663-3171 or email JLM@careyvillewells.com.

Specific Questions?

Need Additional Information?

Careyville Wells InfoLine:
(620) 663-3171
Email: JLM@careyvillewells.com

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**REPORT
ON TESTING
& EVALUATION
OF OLD
SOLUTION
MINING WELLS**

An update
for residents
of the
Careyville
neighborhood

WHAT'S NEXT

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Why this project

This vacant property to the north and east of the Careyville residential area was acquired by VigIndustries, a subsidiary of The Mosaic Company, through a company merger. Our ownership began in 2004, long after the old solution mining wells had been drilled, used, and abandoned.

Wanting to be a good neighbor as well as responsible corporate citizen, we made a commitment to assessing the property to ascertain if any maintenance was needed. A representative of VigIndustries contacted each home in the area by personal visit or letter to apprise residents of our intentions.

What we've done to date

VigIndustries developed an assessment plan and contracted with the internationally respected Burns & McDonnell to conduct testing and analysis on representative wells that would provide a valid overview of the area situation. We chose this highly qualified engineering firm to assure the evaluation was performed to the most exacting standards of accuracy and objectivity.

The entire project has been coordinated with The Kansas Department of Health and Environment (KDHE) and the City of Hutchinson.

Drilling was conducted on four wells in Careyville so three methods of testing could be accomplished:

- Gamma rays logs to determine geological layering
- Sonar to determine cavern shape
- Acoustic televiewer for fractures

Additionally, a surface seismic survey was conducted over the tops of caverns to attempt to detect stress buildup in the rock.

What we found

Generally, for the older wells (pre-1975), a collapse could begin with stress buildup above the cavern, causing slabs to fall and the cavern to fill and expand upward.

There are two factors regarding a potential collapse -- **timing**, when the cavern could fail; and **rapidity**, how quickly the cavern could collapse. These factors are affected by rock mechanics including:

- Long periods of quiescence (inactivity) is often seen
 - Buildup of stress within elastic rock mass
 - Slaking or dissolving
- Sudden episodes of displacement may occur
- Early warning signs such as creep, road sag, and subsidence which can occur over hours, days, or weeks

There have been four cavern collapses in this area over a 77-year span: two occurred in 1978, one in 1990, and one in 2005. The collapse of any given cavern cannot be predicted accurately and they do not occur at regular intervals.

Regarding this investigation, two of the four wells which were investigated are adjacent to the western property line which parallels William Street in Careyville. The results of the investigation indicate that neither of the caverns associated with these two wells appear to pose a short-term threat of collapse. Likewise, the well drilled adjacent to Carey Boulevard to the east of Careyville shows a very small, deep void. The largest cavern detected during this phase of the investigation is associated with a well located near the northern property line (north of Carey Boulevard).

The next steps

Even though it doesn't appear there is any reason for immediate concern at this time, We want to do what is in the long-term best interest of the neighborhood. We have decided the most responsible course of action is:

- **to purchase the homes** adjacent to the abandoned solution mining wells,
- **to use that area to create a stabilized safety buffer** and provide Careyville residents an added sense of protection.
- VigIndustries will thoroughly clean the buffer area by removal of the houses, install fencing, and maintain the property.

The real estate transactions are being handled on behalf of VigIndustries by Karen Gilliland of Plaza Astle Realty: (620) 727-1818 or karen@astle.com.

VigIndustries will be proceeding with additional investigation and evaluating remediation options. Indirect mitigation actions may include increasing the buffer zone, monitoring for early warning signs, and possibly sand grouting. Physical remediation efforts may include backfilling with sand, coal fly ash, or other materials prescribed by KDHE.

Careyville Wells

EAST

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BACKGROUND FOR MEDIA

■ VigIndustries, a subsidiary of The Mosaic Company, acquired ownership of this vacant property to the north and east of the Careyville residential area through a company merger in 2004.

■ The area is the site of several old solution mining wells remaining from the days of the former Carey Salt Company and its successors. Mining operations on this property were terminated years ago. VigIndustries, nor any other subsidiary of The Mosaic Company, has ever been involved with mining activity on this property.

■ As a precautionary measure, VigIndustries wanted to properly assess the property to ascertain if any maintenance was needed. Working in concert with The Kansas Department of Health and Environment (KDHE) and the City of Hutchinson, VigIndustries developed a testing plan for five representative wells.

- > To assure the evaluation was performed to the most exacting standards of accuracy and objectivity, VigIndustries contracted with the internationally respected engineering firm of Burns & McDonnell to conduct the testing and analysis.

■ Prior to initiating the testing, representatives of VigIndustries personally visited each household in the immediate area to explain why there would be the drilling equipment and technicians working adjacent to their neighborhood. Letters were sent to other Careyville residents and property owners.

- > Each residence was given an explanatory brochure which included an InfoLine phone number and email address in case they had future questions.
- > VigIndustries established a web site -- careyvillewells.com -- as another means for keeping residents informed.

■ The testing was conducted between May and October, 2008.

- > The series of tests included *sonar surveys* and *down-hole geophysical logs* at the selected wells, plus *surface seismic surveys* over the tops of several wells.
 - **Sonar surveys** are used to determine cavern shape and volume.
 - The surface **seismic tests** help plot some variations in the subsurface rock.
 - **Video logs** of the walls allow inspection of the well casing and rock below. **Gamma rays logs** determine the top of cavern depths at the bore hole, and a **sonic/cement bond log** assesses the condition of casings, casing seals, and the bore hole wall.

■ Although the testing results did not reveal any immediate areas of concern near Careyville homes, there is no technology that can accurately predict if and when a potential subsidence event may occur in the future. VigIndustries has decided the most responsible course of action for the long-term best interest of the neighborhood is to purchase those homes immediately adjacent to the abandoned solution mining wells and petition the City of Hutchinson to vacate or close a section of Carey Boulevard. This will allow VigIndustries to establish a buffer between the old wells and Careyville residents.

■ VigIndustries will completely clear the buffer area by removal of the houses, install fencing, and maintain the property.

For additional information:
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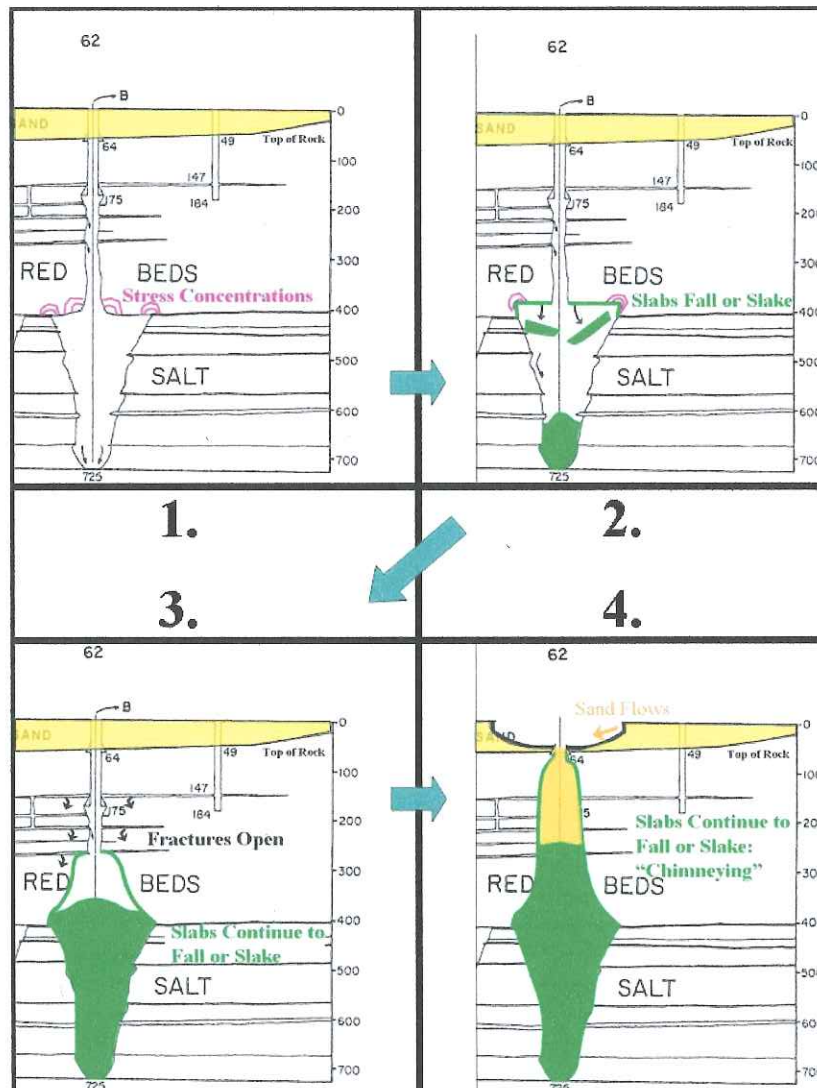


August 28, 2009
Geological Evaluation for VIG Industries
Former Carey Salt Company Solution Mining Wellfield, Hutchinson, Kansas

Burns & McDonnell has performed extensive geological investigation and evaluation of the solution mined caverns adjacent to the Careyville neighborhood in Hutchinson, Kansas. Principal findings of the evaluations to date, relative to the Careyville neighborhood are as follows:

- Solution mining in the wells near the Careyville neighborhood was carried out in the area since the early 1900s, and ceased over 30 years ago.
- Since the wells in this vicinity were mined before the 1975 revised State regulations, the cavern roofs are likely at or near the top of the salt (at depths of about 400 feet), and are more likely to be in the overlying shale bedrock. (Post 1975 wells are much more stable.)
- The shale bedrock is subject to long-term potential breakdown over multiple decades; Cavern #19, which collapsed near the railroad in 2005, had stood for over 70 years after mining ceased there.
- If collapse of a cavern occurs, it may form a crater rapidly and possibly with few or no advance warning symptoms at the surface. Conversely, in some occurrences, there may be little or no surface expression of a cavern collapse due to the bulking of materials as they fill the subsurface void.
- Surface crater formation is due to the flowage of the near-surface sands (which overlie the bedrock to depths of approximately 60 feet) into the salt cavern void upon collapse of the shale bedrock roof beam over the cavern, as shown in attached Sketch 1.
- Ongoing annual surveyed elevation data for all wellheads in the wellfield indicates that none of the wells adjacent to the Careyville neighborhood have shown any evidence of subsidence or sinking. Therefore, any potential ground sinking or cracking out in the neighborhood cannot be related to these wells.
- Review of available documentation from the old salt mining records and KDHE files revealed no evidence of other, abandoned salt solution mining wells associated with former Carey Salt operations in the Careyville neighborhood.
- A conservative "safe zone" line approved by KDHE is defined by the radius of the largest salt mine sink in Kansas history, as shown in attached Sketch 2.
- As best as can be judged or estimated at this time, cavern backfilling would probably be in the same cost range as home acquisition to build up the proposed buffer zone (or possibly even less due to cheap supplies of sand here). However, backfilling these wells would likely take a number of years (possibly up to a decade), such that the passage of time for that option would comprise an increased risk of collapse, whose timing is unpredictable. It would also involve potentially disruptive construction activities.

Sketch 1. Crater formation at the surface is the result of flowage of loose sand at the surface into the cavern via a collapsed shale roof beam.

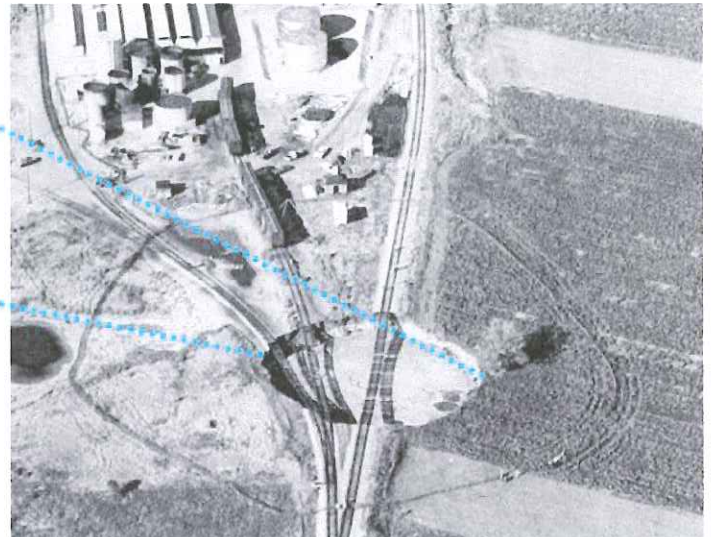
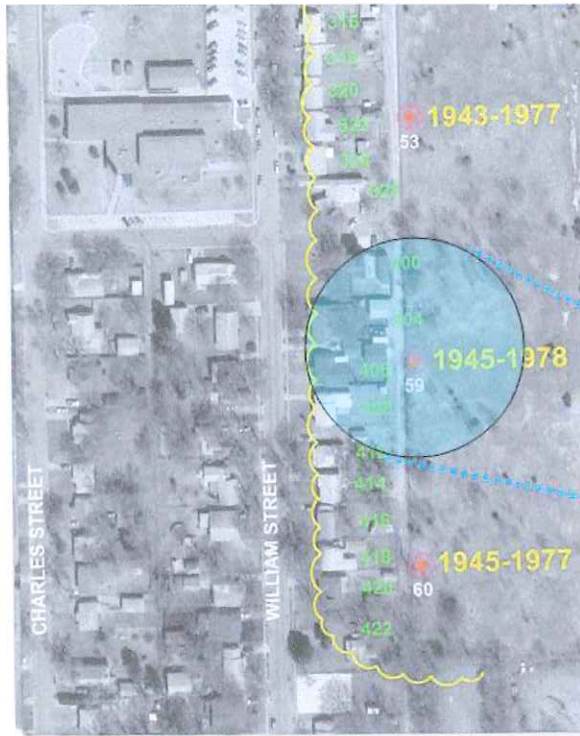


Progression of a collapse is: (1) Buildup of stress in the shale bedrock roof beam; (2) and (3) Gradual or sudden, progressive falling of the cavern's shale roof beam, that: (4) Allows the near surface, largely saturated, loose sands to flow down into the cavern void, creating a crater at the surface. The crater diameter is dictated by the size of the cavern void: Large void = big crater; Small void = small crater.

Sketch 2. Establishing KDHE Approved "Safe Zone" Boundary as Worst Case Crater in Kansas

William Street Vicinity

Largest Historical Kansas Sink (1974)



"Safe Zone" boundary (yellow line), as approved by KDHE, was defined by superimposing the radius (160 to 180 feet) of the largest salt well sink in Kansas history (1974, in southwestern Hutch) onto the wellheads of the former Carey salt wells along William Street and Carey Blvd, assuming these wells were ever to collapse.

This represents a conservative approach to protection of human health and safety because any sinks that might form if the Carey well caverns were to collapse would likely be smaller than the 1974 collapse, because it was in a huge gallery of multiple wells when it fell, while the salt tonnage records for the Carey wells indicate relatively small caverns. Since the salt tonnage records are a bit uncertain as to accuracy and completeness, a safe approach was to assume the worst case known scenario.